REMARKS/ARGUMENTS

Introduction:

No claims are amended, added, or newly canceled. Claims 26, 33, 35, 36, 41, 42, 48, 73-85, 87, 89-92, 94, 97-99, and 103-110 remain pending in the application. Applicants respectfully request reconsideration of the application.

Initially, Applicants thank the Examiner for the courtesy extended to Applicants' representatives at an in-person interview on April 24, 2008. As discussed at the interview, Applicants submit with this Paper a declaration setting forth evidence that the characteristics and performance of palladium cobalt as a contact material for probes of a probe card were unexpected.

Double Patenting:

Claims 105, 106, 108, and 109 were rejected on the grounds of non-statutory obvious-type double patenting over claims 8-15 of US Patent No. 6,520,778 in view of US Patent No. 5,632,631 to Fjelstad et al. ("Fjelstad"), US Patent No. 5,177,438 to Littlebury et al. ("Littlebury"), and US Patent No. 3,648,355 to Shide et al. ("Shide"). Applicants will file a terminal disclaimer but would prefer to do so after all other issues regarding patentability have been resolved.

Obviousness:

Claims 26, 33, 36, 41, 42, 48, 73-99, and 103-110 were rejected as obvious in view of US Patent No. 5,810,609 to Faraci et al. ("Faraci") and one or more of Fjelstad, US Patent No. 5,476,818 to Yanof et al. ("Yanof"), Littlebury, and Shida. In addition, claims 26, 33, 36, 41, 42, 48, 73-99, and 103-110 were rejected as obvious in view of US Patent No. 5,811,982 to Beaman et al. ("Beaman") and one or more of Fjelstad, Shida, and Yanof, and Littlebury, and claims 107 and 110 were rejected as obvious in view of Beaman and US Patent No. 5,326,428 et al. to Farnworth et al. ("Farnworth"). Applicants respectfully traverse these rejections.

Applicants thank the Examiner for the helpful comments at the interview explaining his assertion in the Office Action that the "selection of a material is typically deemed a matter of obvious design in absence of any new or unobvious result produced by such election" and that

his finding of obviousness, in this application, is based at least in part on the fact that "no evidence or even assertion of . . . unobvious result" has been made.

In response, Applicants submit with this paper the declaration of Dr. Rodney Martens. As set forth in Dr. Martens' declaration, the performance and characteristics of any material used as a contact tip for probes making hundreds of thousands of contacts with given bond pads of semiconductor dies cannot be predicted in advance. (Martens Decl. ¶ 5.) In fact, FormFactor scientists and engineers initially thought other materials (e.g., nickel cobalt and gold cobalt alloys) might exhibit the desired hardness and electrical conductivity characteristics. Empirical results, however, showed that those materials either (1) did not have—or did not maintain through repeated contacts with bond pads of semiconductor dies—the desired wear and electrical conductivity characteristics, or (2) exhibited undesirable side effects, such as sticking to the bond pads of the semiconductor dies. (Martens Decl. ¶ 6 and 7.)

Moreover, there was little to no reason to suggest palladium would exhibit the desired characteristics. In fact, there was reason to believe palladium would not make a suitable contact tip material for probes designed to contact bond pads of semiconductor dies hundreds of thousands of times. This is because palladium was known sometimes to form electrically resistive polymers when repeatedly rubbed against another structure. Thus, if anything was expected of palladium as a contact material for such probes, it was expected that palladium would have a tendency, over time and thousands of contacts with bond pads of semiconductor dies, to form electrically resistive polymers, which would be undesirable for a probe whose purpose is to establish electrical connections with semiconductor dies for testing the dies. (Martens Decl. ¶ 9.)

For at least the foregoing reasons, Applicants respectfully assert that palladium cobalt—as a contact material for probes of a probe card—provides unexpected results throughout the life time of a probe card, which includes hundreds of thousands of contacts with bond pads of semiconductor dies. For at least this reason, all pending claims are patentable over the prior art of record.

Applicants note that Shida is the only reference utilized in the last Office Action to reject the claims that discloses palladium cobalt. Although some of the other references mention palladium alloys, those references do not specifically identify palladium cobalt. As set forth in Applicants' most recent Response, it would not be possible—much less obvious—to substitute

Shida's three-layer sheet (see Figure 1 of Shida) for either the asperities 320 of Faraci or the plated bump 71 of Beaman. For example, Faraci's asperities 320 are small protrusions from cantilevered contact arms 190, 200. A three-layer sheet like Shida's sheet is not equivalent to nor can it be substituted for small protrusions or asperities 320 on contact arms 190, 200. Likewise, a three-layer sheet like Shida's sheet is not equivalent to nor can it be substituted for Beaman's plated bump 71. For at least this reason, Shida does not support a finding of obviousness.

Conclusion:

In view of the foregoing, Applicants submit that all of the claims are allowable and the application is in condition for allowance. If the Examiner believes that a discussion with Applicants' attorney would be helpful, the Examiner is invited to contact the undersigned at (801) 426-2106.

Respectfully submitted,

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